CHPS: Status Update

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Semi-Annual HIC Meeting

24 July 2007

Agenda

Summary of Progress

- CHPS Information: One Stop
- ResSim (Apex, Delft, HEC)
  - Implementation phase, initial install at CNRFC (9 July)
- CHPS FEWS Pilot (RTi, Delft, OHD/RSIS)
  - First pilot demo done (April); enhancements underway
- AWIPS II – CHPS Interface (Raytheon, Apex, Delft)
  - Initiated contract task with Raytheon (June)
- Hydraulic Model into CHPS (Apex, OHD, HEC)
  - HEC-RAS implementation analysis contract initiated (June)
- CHPS Model Expansion (OHD/RSIS)
  - XEFS work started (June)
- HydroXC (Apex)
  - Demo of SHEF .B to XML converters (June)

CHPS Information

CHPS web site now operational:

http://www.nws.noaa.gov/ohd/hrl/chps/index.html

(Contains background information, quarterly status updates, other links)

ResSim: Background

- Project Description
  - Enhance and put USACE's HEC Reservoir Simulation (ResSim) model into operational use at CNRFC from NWSRFS
  - Link ResSim model into CNRFC operations *without directly integrating software within NWSRFS code*
  - Make all ResSim upgrades easily and quickly available to CNRFC
  - Ultimately provide to all RFCs
- Three year joint HEC-OHD effort 2006 – 2009
  - HEC to provide enhancements to ResSim in two phases (deterministic and probabilistic)
  - OHD to provide SOA-based "portal" between NWSRFS and ResSim
    - Solution must work in current CNRFC operational environment (AWIPS)
    - Solution should be CHPS-ready for future operational environment (SOA; use Delft-FEWS)
- Funded by Yuba County Water Agency

ResSim: HEC Status Update

- Phase 1 – Enhancements to ResSim basic deterministic functionality
  - Work Order 2, Tasks 2-12: Implement features designed in Work Order 1
    - Early Linux version of ResSim delivered to Delft at end of June for integration with Delft-FEWS
    - Final acceptance testing of Linux/enhanced ResSim running at CNRFC expected mid-September
- Phase 2 – Enhancements to support ensembles
  - Work Order 3, Task 13: Design ensemble features
    - Not started
  - Work Order 4, Tasks 14-17: Implement features designed in Work Order 3
    - Not started

ResSim: OHD Status Update

- Contract with Apex & Delft
- Phase 1: Design
  - *HOSIP Gate 2/3 passed 21 February*
- Phase 2: Implementation
  - Technical design *complete*
  - ResSim adapter implementation *complete*
  - Configuration and installation of Delft-FEWS @ CNRFC *complete*
  - First delivery of HEC's Linux-based ResSim *complete*
  - (Final HEC functional updates *still in progress*)
  - CNRFC functional testing *beginning now*
  - Acceptance testing scheduled for mid-September
  - ATAN for CNRFC to be initiated in August
  - HOSIP Gate 4 expected September
  - CNRFC to run parallel with normal operations this winter

CHPS FEWS Pilot: Background

- Approach
  - Demonstrate viability of FEWS in an NWS RFC environment
    - Purpose is to demonstrate complete forecast model thread on representative river basins
    - Purpose is NOT to compare FEWS results with NWSRFS
    - Accomplish in a short time
    - Develop as little throw-away code as possible (maximize re-use)
  - Keep all CAT members in the loop
    - CAT = NCRFC, NWRFC, ABRFC, CNRFC, OHD Sr. Scientist
    - Regular status reports, “CHPS FEWS Pilot Project” list server
    - All members to attend final demo
    - Use HOSIP Gate reviews to gain insight into technical details

CHPS FEWS Pilot: Status Update

Delft-RTi activities

- Phase 2: Implementation - complete
  - RTi wrote DB Export application to extract data from operational IHFS database for use by Delft-FEWS
  - Delft configured selected basins for NCRFC and NWRFC, set up workflows
  - Everything completed by April 17 2007

CHPS FEWS Pilot: Status Update

OHD/RSIS Development Team activities

- Phase 2: Implementation - complete
  - Started with original Fortran lumped SAC-SMA HT model from Victor Koren – delivered (wrapped) to Delft 26 Jan 2007
  - Ported Fortran to Java, using SSHP version of SAC-SMA as a basis – delivered to Delft 26 Feb 2007
  - Re-factored Java version of SAC-SMA HT
  - Fixed bugs identified during testing
  - Future delivery(ies) to be arranged

CHPS FEWS Pilot: Status Update

CHPS FEWS Pilot contains:

- Unit Hydrograph operation (Delft's existing Unit Hydrograph operation)
- Snow model (Delft's existing SNOWMELT model)
- SAC-SMA with Heat Transfer model (SAC-SMA HT application converted to Java and integrated with FEWS by OHD/RSIS)
- Channel Routing model (Delft's existing Muskingham method)
- Reservoir Routing model (Delft's existing reservoir model)
- Workflows that mimic existing HCL (Delft's existing XML-based control flow)
- Basic time series transformations (Delft's existing time-series transformations)
- Ability to conduct 'what-if' scenarios (Delft's existing what-if capability)
- Estimation of missing data and computation of basin area averages from point values (Delft's existing modules, similar to NWSRFS pre-processors)
- Export of data from the operational AWIPS IHFS database to FEWS (DB Export application developed by RTi)

CHPS FEWS Pilot: Results

- Pilot demo held at NWRFC April 17-18, 2007
  - Outcome: successful yet need more features to determine if FEWS is the right solution for RFCs
    - CAT members defined features
    - OHD initiated new contract task – to be awarded this week?
- HOSIP Gate 4 passed May 9, 2007
  - Original pilot project complete
  - Enhancements will be handled as different HOSIP project

CHPS FEWS Pilot: Results

Features to be added:

- Convert the pilot to a client-server system at each Pilot RFC (multi-forecaster)
- Configure and install the pilot system at ABRFC
- Develop a MODS-like capability to supplement the FEWS “what if” scenario; base on the “Tune” capability developed by Delft for their PRTF Model
- Port NWSRFS SNOW-17 operation into FEWS Pilot
- Provide extra support for the existing FEWS Pilot systems, including:
  - Training for NWRFC, NCRFC, and ABRFC to teach them how to try some configuration work independently (e.g., configure a new basin)
  - Assist NWRFC with re-configuring the Santiam basin into separate segments
  - Configure one Pilot RFC (site to be determined) to use hydrologic forecast ensembles
  - Support for reported problems and small change requests
- Conduct workshop to demonstrate the new features

CHPS FEWS Pilot: Next Steps

CAT Meeting 18 June; strategy adjusted:

- Hold off FEWS Pilot evaluation for now
- Wait for added features/training (Enhanced Pilot)
- CAT members & OHD to define required capabilities for CHPS Initial Operating Capability
  - Chris now compiling IOC capabilities input
- Identify gaps between Enhanced Pilot & CHPS IOC
- Conduct cost-benefit analysis
- Arrive at decision point spring 2008

CHPS FEWS Pilot: Late News

- Unanticipated contract delays have prevented RTi/Delft from formally beginning work on this project
- Conference call (7/19) to discuss impact of delay: RTi (Danny Dishon), Delft (Karel Heynert), OHD (Jon Roe, Chris Dietz)
- Outcome
  - One month schedule slip
  - Hold project kickoff meeting on Aug 14
  - Installation/upgrades Nov 26 to Dec 7
  - Workshop week of Dec 10 to Dec 14
    - Where? Balmy ABRFC or frigid NCRFC?

AWIPS II – CHPS Interface

- AWIPS II Overall Project:
  - AWIPS Development Environment (ADE) v1.0 delivered June 2007
    - All development organizations received some specific ADE training
    - OHD to receive OS&T-sponsored SOA training this fall
  - Raytheon to re-engineer all AWIPS components using ADE services
    - AWIPS II Release 1.0 to be delivered June 2009 – June 2010
    - NWSRFS to get simple black box wrapping, same look & feel
    - CHPS to replace NWSRFS after AWIPS II roll out
  - Comprehensive talk by Jason Tuell later today

AWIPS II – CHPS Interface

- OHD initiated task with Raytheon (RIS) in June
  - RIS will analyze Delft-FEWS Pilot as example of CHPS
  - RIS and Apex/Delft will jointly define boundaries between RFC-hydro and AWIPS II and identify tasks to be completed
  - Analysis results critical for CHPS GUI decisions
  - OHD to allocate tasks appropriately (some OHD, some contractor)
  - RIS setting up first Technical Interchange Meeting (TIM) for August

Hydraulic Model into CHPS

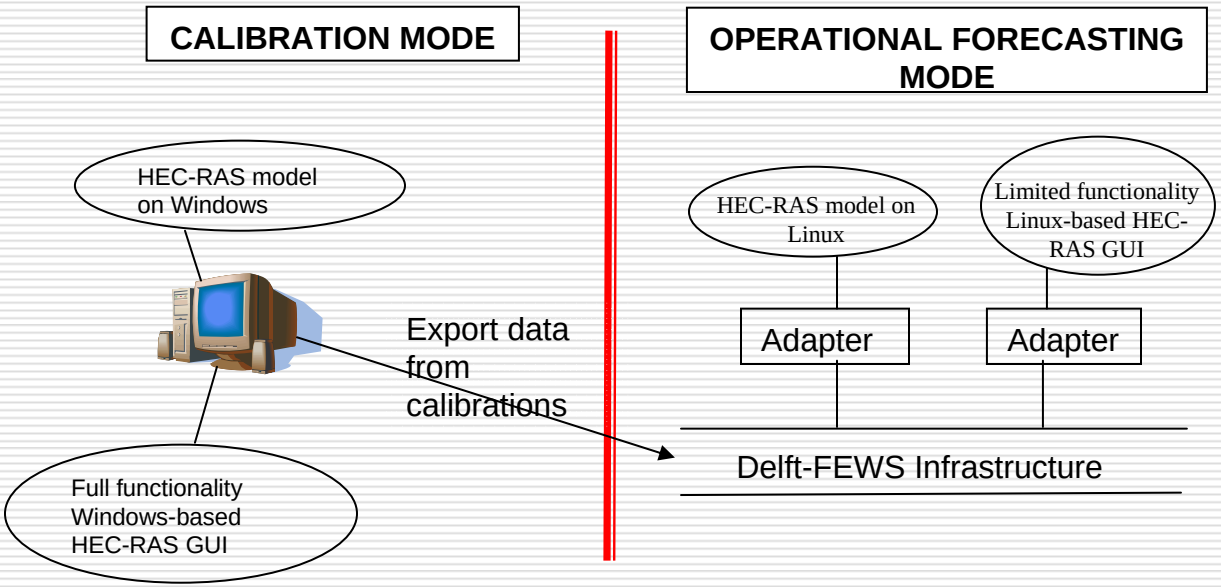
- Hydraulic model key component for CHPS Initial Operating Capability
- FLDWAV in use now
- HEC-RAS desired in CHPS

Hydraulic Model into CHPS

- OHD began discussions in June with HEC to incorporate HEC-RAS into CHPS
  - Apex hired to conduct analysis of CHPS work involved to link to HEC-RAS in a way similar to ResSim
  - HEC to make RAS engine run in AWIPS environment
  - Complex/large RAS GUI needs Windows – not easy to port
  - 'Interim' solution requires Windows platform for calibration
  - Need to assure that Windows RAS engine is identical to Linux RAS engine to make hybrid solution work
  - HEC to do most of the work; may use other contractors if needed (e.g., Delft, RSIS, RTi)

Hydraulic Model into CHPS

Proposed ‘interim’ solution for HEC-RAS into CHPS



CHPS Model Expansion

- Ensembles
  - eXperimental Ensemble Forecast System (XEFS) working group delivered “Design & Gap Analysis” report to Gary Carter on 11 May 2007
  - Oversight Committee formed May 2007:
    - Rob Hartman, CNRFC
    - DJ Seo, OHD
    - Chris Dietz, OHD
    - Mary Mullusky, OCWWS
  - Execution Manager identified (Chris Dietz, OHD)
  - Inventory of prototype software began June 2007
  - Draft implementation plan due August 2007
  - Must be done within CHPS framework
  - XEFS project update coming Thursday

CHPS Model Expansion

- Operational Distributed Hydrologic Modeling
  - Continue with NWSRFS-based version of DHM until after AWIPS II roll out
  - Schedule for CHPS-based DHM solution yet unknown
  - Modular design of prototype HL-RDHM and baseline DHM will facilitate maximum code re-use into CHPS

CHPS Model Expansion

- Ultimately all new science prototypes will be developed in a CHPS environment greatly reducing time and effort to get science into operations

HydroXC: Status Update

Progress

- www.hydroxc.org web site went live (April)
  - Old link still available, http://www.nws.noaa.gov/ohd/hydroxc/index.html
- Schema version 3.0 posted to website
- First set of hydrologic object templates defined
- Dr. Michael Piasecki (Drexel University) presented at Geoinformatics Data to Knowledge Conference in San Diego, CA, May 17 - 18, 2007
- Apex developed proof of concept tools capable of converting back and forth between SHEF .B format and HydroXC format. Demonstrated at Consortium meeting on June 21

Future Plans

- More objects and tools needed; Consortium members need to help
- OHD plans to continue by incorporating HydroXC in future projects where appropriate

Next Steps

- Continued RFC involvement in evolution of CHPS
- Continue examination of Delft-FEWS as infrastructure for CHPS to get to decision
- All new RFC science projects to be targeted for CHPS
- Top OHD priorities for CHPS:
  - CHPS Initial Operating Capability
  - XEFS into CHPS
  - Integration with AWIPS II
  - HEC-RAS hydraulic model into CHPS

End of Presentation

Comments or questions now?

More open CHPS discussion later today